

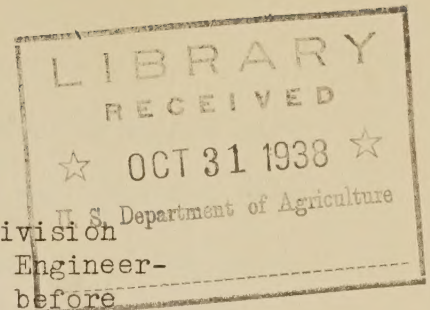
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FIRE PROTECTIVE CONSTRUCTION
ON THE FARM

An address by Wallace Ashby, Chief, Division
of Structures, Bureau of Agricultural Engineer-
ing, U. S. Department of Agriculture, before
National Safety Council Congress, Chicago,
11:15 A.M., Tuesday, October 11, 1938.



I believe there is an unusual opportunity for the National Safety Council and cooperating organizations to do something constructive to reduce fire losses on farms. For the most part, of course, protective measures must be taken by farm people themselves, but now is the time to convince them of the value of fire safeguards because they must soon do a large amount of building. An enormous demand for repairs and replacement has piled up during the years farm income was abnormally low. A few figures will outline this situation.

First, there are about 6,500,000 farms. The 7,250,000 dwellings on these farms represent an investment of about \$7,000,000,000. Barns and other service buildings represent an additional \$6,500,000,000. A large proportion of these buildings need repair or replacement very soon. Estimates based on a survey of farm housing conditions by the Department of Agriculture in 1934 showed that between 600,000 and 1,000,000 new farmhouses were needed. About 1,250,000 houses needed new roofs and 1,750,000 other farm buildings needed roof repairs. Similarly, it was estimated that about 600,000 new chimneys and 900,000 chimney repairs were needed. As to buildings other than dwellings, a special survey indicated that extensive building repairs were needed on 2,750,000 farms. One or more new buildings were needed on 2,250,000 farms.

I wish to emphasize that only a small part of the needed work has yet been done, and we may expect a great many old buildings that are fire hazards to be replaced or rebuilt within the next few years. Now is the time to urge farmers to avoid the old hazards in their new building.

Need for Fire Protective Construction on Farms

In many respects the need for fire protective construction on farms is greater than in towns, for protection by organized fire departments is less adequate and usually there is little chance of putting out a fire that gets well started. As one insurance adjuster puts it, "It is our experience that if a loss on a farm building exceeds \$50 it is almost invariably a total loss. In other words, if the owners or tenants do not discover a fire in time to put it out with very slight damage they cannot stop it at all."

Also, a farm fire may result in hardships not associated with fires in town. For example, in severe weather, when many farm fires occur, suffering may be acute even if family and livestock are rescued and the financial loss is covered by insurance. The farm family is tied to the livestock and the crops; conveniently located quarters are usually hard to find, and feed supplies are difficult to replace.

In some respects there is more risk of fire starting in rural than in urban districts. For example, lightning strikes a much larger percentage of buildings in the country than in town. Stoves and ^{open} fire-places are the predominating types of heating units in farmhouses, and

as fires are needed in several rooms instead of the single fire in a house that has a furnace the fire risk is greater. The use of wood fuel for heating and for cooking is common in the country and adds to the fire risk both because a stove may become overheated in a few minutes after the fire is lighted and because creosote very often accumulates in the chimney, with the attendant danger that it may "burn out" and set fire to the roof or to an adjoining structure. Also, as electricity and piped gas are not generally available, kerosene and gasoline are extensively used for lights and cooking.

The barn is a serious fire hazard because the hay may be ignited by a careless smoker, or by lightning or spontaneous ignition, or by a lantern, or defective wiring. A fire in a livestock barn is a special threat because the farmer or his helpers, are in danger of injury both from the fire and from the frightened animals which must be released and driven out.

Buildings for Irish potato or sweet potato storage, milk houses, tobacco barns and buildings for brooding chicks and even those for young pigs are often heated, but probably involve less risk to persons than the dwelling or the barn. There is little fire risk connected with silos, cornerribs or granaries, but buildings which house steam boilers, gasoline engines or other motors, or in which gasoline or kerosene are stored are, of course, hazardous. Almost every farm uses a considerable quantity of these fuels for lighting, cooking or power.

Since I have called attention to the special fire hazards on farms it is only fair to remind you that farmers customarily adopt some safeguards that are not feasible in urban districts. For example, the buildings are usually located far enough apart that fire will not spread readily from one to another. One hundred or more feet between house and barn is usual except in New England where the practice of connecting buildings is common on account of the deep snows. That this separation of buildings is effective in retarding the spread of fire is indicated by an Iowa survey that showed only 8% of farm fires involved groups of buildings and these accounted for only 14% of the losses. A similar conclusion may be drawn from a report recently published by Dr. V. N. Valgren of the Farm Credit Administration, showing that in New England, the only section in which it is the general practice to connect the house and the other buildings, 1935 losses per \$100 of insurance by farmers mutual companies were more than twice the average for the whole country.

The general use of relatively low buildings also reduces the risk to life, though perhaps it does not affect property loss. For example, the one-story house tends to minimize the danger of loss of life in farm fires by making it possible for the occupants to escape with much less difficulty or danger than from a higher building. Almost sixty percent of all farm houses are one story and, fortunately, the proportion reaches 90% in the South, where the type of construction used is least resistant to fire. Few farmhouses have more than two stories, and in houses of more than one story it is the usual practice for the

parents to sleep downstairs where they will be quickly aroused in case of fire or other disturbance. Another protection is the inclosed stairway generally used, which retards loss of heat to the upstairs rooms and in case of fire delays its spread. The protection in 2-story houses is increased by a second stairway or access to a porch roof that may serve as a fire escape. The use of single-story barns with hay stored in a separate structure reduces the risk to livestock. The relatively new practices of storing grass as silage and of using metal containers similar to silos for cured or dried hay are examples of progress in fire prevention through changes in farm methods. Progress is also being made in the use of fire-resistive materials, especially for walls and roofs.

Losses from farm fires in recent years have been estimated as high as 3500 lives and \$100,000,000 worth of property per year. Several investigations have been made to determine the principal causes of these losses. I quote a statement from one such study made in 1930-31 in Iowa: "Of the known causes, sparks on combustible roofs and defective flues were the largest items in dwelling fires, while spontaneous combustion of hay and straw and lightning on unrodded buildings were responsible for the major amount of barn losses."

The same general situation as to causes of farm fires exists in the South. A few days ago a fire insurance adjuster in the Carolinas wrote me as follows: "We adjust in this office a goodly number of fire losses on farm buildings, and we usually find that at the time of the

first good cold snap in the fall or early winter we have an epidemic of farm dwelling fires. These are caused in most cases, we think, from overheated stoves or from building large fires in open fireplaces, the actual origin of the fire being either from overheated smoke pipe, sparks escaping through loose joint in bricks of the chimney or sparks falling on a shingle roof.a large number of the farm structures in the South have shingle roofs. In regard to fires in barns and other outbuildings, we find the most common causes are lightning, spontaneous combustion caused by green hay, and carelessness of people smoking about the buildings."

These reports and others point clearly to the need for better built chimneys, more resistive roofs, and more careful installation of heating equipment in farm dwellings; they also show the importance of lightning protection for barns and for care in curing and storing hay. With them should be included safe electric wiring.

A second line of defense is needed, however, to retard the spread of a fire that may start from any cause. This is provided by construction that will confine the fire to the place of origin as long as possible. These safeguards may include use of non-combustible material for walls, floors and stairs, or the protection of wood construction by fire-resistive materials and fire-stopping of the openings between studs and floor-joists so that they do not act as chimneys to carry the fire.

I will not try to discuss these matters in detail here, because they are fully covered in bulletins of the Department of Agriculture, of the State agricultural colleges and of the National Fire Protection Association and the National Board of Fire Underwriters.

How Can Farm Building Practices Be Improved?

I am particularly interested in ways to persuade farmers that these precautions are worth the trouble and expense. We must recognize how highly individualistic the farmer is. Usually he assembles much of the material beforehand, hauling gravel or stone for the foundation, perhaps cutting his own timber and having it sawed at a local mill or buying bargain lots of material as opportunity occurs. He may wreck an old building and use the salvaged material or utilize an old foundation. This process of assembling material may go on for 2 or 3 years before the building is started. Plans come from many sources; often there is nothing more than a sketch drawn on a shingle by the carpenter, together with his memory of a neighbor's building. Sometimes the local lumber dealer furnishes plans prepared by a manufacturer to demonstrate the use of his product. In an increasing number of cases, plans are obtained through the State agricultural colleges, though in many cases the building is modified to fit the materials that have been assembled, and to conform to local practices. Protective features in the original plan are often omitted in construction.

The farmer usually helps with the construction, including excavation for the foundation and the cellar and part of the rough carpentry. When building a house, barn, or other major building, however, he depends on the local carpenter and mason to boss the job and do the more skilled work. These country builders are the most important persons influencing the design and construction of farm buildings. I have often inquired as to why certain things were done and why plans were changed.

The answer usually was that the carpenter thought it ought to be done the other way. Very often that other way omits the protection that was intended. How can we persuade the farmer and these builders that they will benefit by building in more fire-protective features as well as by accepting building layouts and features of design that have been tested and proved convenient and satisfactory by the experience of others.

The adoption of rural building codes might be considered as is being done in the case of electrical wiring and installation on farms. There is at present much concern about this because of the large number of new users of electricity connecting to lines extended under Rural Electrification Administration and public utilities programs. Some new technical problems are also involved because of the presence of very high humidities and of ammonia vapors in stables. As you know, there is a general movement to require inspection and approval of the wiring under the authority of the State Fire Marshals before the public utility is permitted to furnish current. This is one case where the farmer's building practices are subjected to the same control as in urban districts. The parallel does not extend to most other features of farm construction, however, since, with the exception of the telephone and in limited areas where they obtain gas and water from pipe lines, farmers do not depend upon public utilities. Compulsory inspection of all farm construction would be a tremendous task and might arouse much resentment.

However, insurance companies which classify their risks and make favorable rates for the better types of construction are exerting a good influence. Insurance inspectors have a more direct personal contact with farmers regarding fire protection than does any other agency. No doubt this is very helpful in calling attention to unsafe practices and recommending improvements. Dr. V. N. Valgren of the Farm Credit Administration in his recent bulletin, Problems and Trends in Farmers Mutual Fire Insurance, states in speaking of inspection by mutual fire insurance companies: "An increasing number of companies employ specially trained inspectors who give their full time to this particular work. Some of these inspectors carry with them tools, equipment, and material for making immediate minor repairs to chimneys and other parts of insured property. Such repairs may restore the property to a relatively safe condition for the rest of the policy term, or it may merely remedy a particularly dangerous condition pending the making of more permanent or extensive repairs by the owner. **** a good inspector will normally save the company in prevented losses substantially more than the outlay involved in employing and equipping him. It should also be remembered in this connection that a fire loss prevented by an inspector not only saves the company from payment of a loss indemnity, but also saves the member who owns the property from that part of any total loss that is not covered by his insurance. In addition to the direct financial loss averted by the prevention of a needless fire, it also avoids the inconvenience and disruption of normal work that such a loss usually imposes on the owner. Furthermore, the prevention of a destructive fire may in some cases save the insured, or members of his family, from painful injuries or tragic death."

Another means of raising standards is through educational bulletins such as those issued by the Department of Agriculture, the State agricultural colleges, the National Fire Protection Association and the National Board of Fire Underwriters. Bulletins of the Department deal with the planning of farmhouses, barns, storages, and other farm structures; and with the use of materials and equipment. Several deal specifically with fire protection, including the subjects of protection from lightning, general safeguards and safe practices, fireproofing fabrics such as window curtains, and rural community fire departments. These are listed at the end of this paper.

There are also two special bulletins prepared in cooperation with the National Fire Protection Association -- Farmers' Bulletin 1590, Fire Protective Construction on the Farm, and Farmers' Bulletin 1678, Safe Use and Storage of Gasoline and Kerosene on the Farm. Farmers' bulletins are sent free on request and are used by county extension agents and State extension workers in answering questions and conducting meetings. Farm papers quote the material and it is used in radio programs. This bulletin material is supplemented by moving pictures, lantern slides and film strips for use of county agents at meetings.

In addition to this educational program, the Department is cooperating with the State agricultural extension services in making generally available to farmers working drawings that can be used by carpenters in erecting the most modern types of buildings. We call this the Farm Building Plan Exchange Service. In the administration of extension programs for this purpose the Department of Agriculture

divides the country into four sections. One includes the Northeastern states, another the Midwest, a third the South, while the fourth includes the Mountain and Pacific states.

About four years ago the agricultural colleges in the Middle West cooperated with the Department of Agriculture and the American Society of Agricultural Engineers in preparing a catalog of farm building plans best suited to that region. In making up the catalog a very large number of plans formerly distributed by the various colleges and by the Department were carefully examined and about 150 were selected as the best for general use in this region. These drawings were then revised and brought up to date. The catalog shows perspectives and floor plans and gives a brief description of each building. It is sold to county agents, lumber dealers, farmers and others who may wish to use it in the Midwest states. Farmers wishing to build may select the plan that suits them from the county agent's or the lumber dealer's catalog and then order working drawings for use of the carpenter through the county agent or direct from the State agricultural extension service. There is a small charge, usually not exceeding 50¢. Complete lists of material required can be had for a small additional charge.

Last year the Department issued a catalog of plans of farm buildings for use in the 12 Northeastern states. These plans were selected by representatives of the State Colleges, on the basis of farm experience in their states, and were revised and brought up to date before publication. This book was distributed free to all county agents and home

demonstration agents in the Northeastern states and is being sold to material dealers, farmers, builders and others for 30¢ per copy. A similar catalog of plans for the 11 western states is now at the Government Printing Office and will soon be available. Still another, designed for the South, is now in preparation.

The catalogs and the working drawings will be revised as occasion demands. Since we recognize that most farmers and many country builders have had little training in reading blueprints, we are simplifying drawings as much as we can and perspectives are used liberally to show details. While the development of this Plan Exchange Service is relatively new, we think it offers excellent possibilities for gradually improving farm building, including fire-preventive construction.

It occurs to me that it might be practical for agencies that make loans for buildings on farms to assist materially in the adoption of safer types of farm buildings by encouraging the use of this Plan Exchange Service by their clients, and by urging them to follow the drawings in detail. I feel confident that as farmers and country builders become acquainted with these plans they will approve them. We recognize that they do not provide for maximum fire protection, but our experience indicates that even if cost were not a factor rural builders would hesitate to adopt radical changes quickly. The present drawings call for the more important features of safe construction, and as conditions permit, further advances could be incorporated in the drawings until the desired standard has been reached by the local builder.

The principle of protecting loans in urban areas by requiring that buildings comply with certain standards is being applied by the Federal Housing Administration. Compliance with F.H.A. standards is recommended when loans are insured by F.H.A. in rural areas but is not mandatory, partly because architects generally are not familiar with the service requirements and the distinctive features of farm buildings, and partly because the land offers a larger proportion of the security in a farm loan than in an urban loan. Strict application of city standards in order to obtain a loan would probably result in a building not well suited for farm use. Loan value would doubtless be increased by utilization of the building plans included in the Plan Exchange Service which meet farm requirements and provide a practical measure of fire safety. The recognition of these plan services by insurance companies and others lending on farm property would, I believe, benefit farmers and protect the lending agencies. Could not the National Safety Council render a valuable service by cooperating in extending the use of such approved drawings?

- 14 -
PARTIAL LIST OF
U. S. DEPARTMENT OF AGRICULTURE BULLETINS
DEALING WITH BUILDING CONSTRUCTION AND
FIRE-PROTECTIVE MEASURES

Farmers' Bulletins:

- 744F -- The Preservative Treatment of Farm Timbers
- 810F -- Equipment for Farm Sheep Raising
- 1132F -- Planning the Farmstead
- 1350F -- Beef Cattle Barns
- 1426F -- Farm Plumbing
- 1448F -- Farmstead Water Supply
- 1472F -- Preventing Damage by Termites or White Ants
- 1500F -- Rammed Earth Walls for Farm Buildings
- 1512F -- Protection of Buildings and Farm Equipment from Lightning
- 1554F -- Poultry Houses and Fixtures
- 1590F -- Fire-Protective Construction on the Farm
- 1636F -- Farm Bulk Storage for Small Grains
- 1638F -- Ratproofing Buildings and Premises
- 1643F -- Fire Safeguards for the Farm
- 1649F -- Construction of Chimneys and Fireplaces
- 1660F -- The Use of Logs and Poles in Farm Construction
- 1667F -- Rural Community Fire Departments
- 1678F -- Safe Use and Storage of Gasoline and Kerosene on the Farm
- 1698F -- Heating the Farm Home
- 1703F -- Reservoirs for Farm Use
- 1720F -- Adobe or Sun-Dried Brick for Farm Buildings
- 1738F -- Farmhouse Plans
- 1749F -- Modernizing Farmhouses
- 1751F -- Roof Coverings for Farm Buildings and Their Repair
- 1756F -- Selection of Lumber
- 1772F -- Use of Concrete on the Farm
- 1786F -- Fireproofing Fabrics

Leaflets:

- 44L -- Fires on Farms
- 87L -- Wind Resistant Construction for Farm Buildings

Circulars:

- 335C -- Distillate Burners
- 406C -- Oil Burners for Home Heating

Commodity Information Series:

- 38-Wheat-1 -- Wheat Storage in the Ever-Normal Granary
- 38-Corn-2 -- Corn Storage in the Ever-Normal Granary

